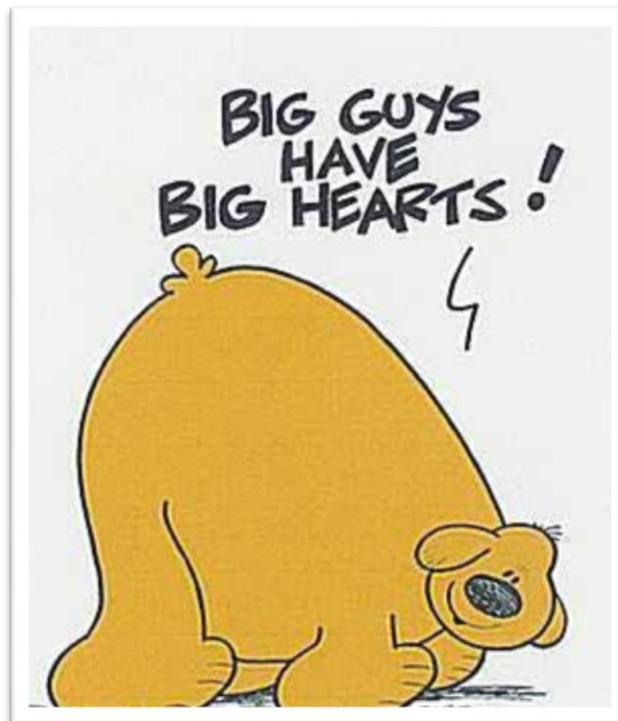




Pressure Volume Changes During Cardiac Cycle

2nd edition



Created By :

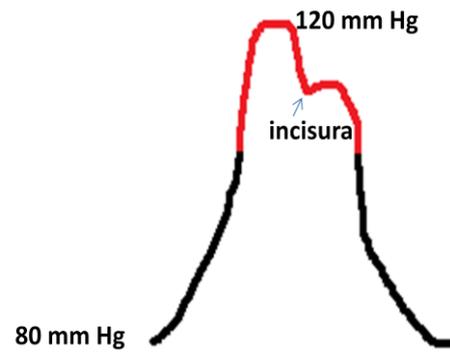
Suhibe Al Masry

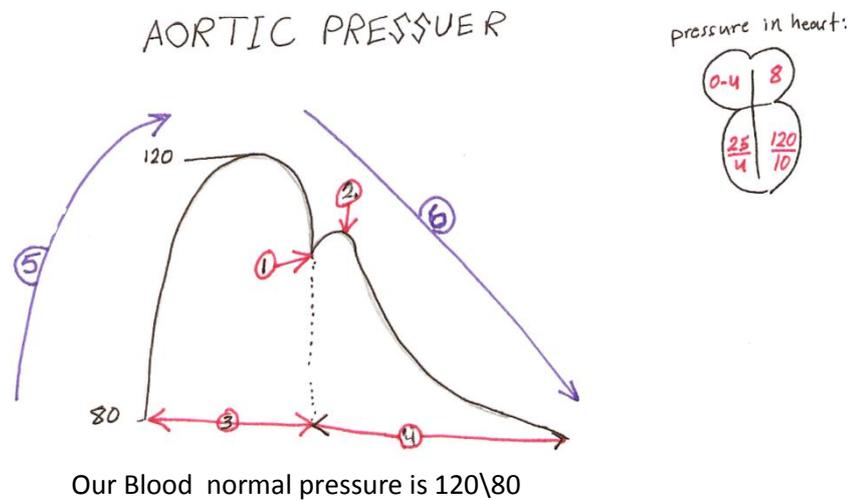
MUHAMMAD AL WATBAN

Reviewed by Prof. Ashraf Hussein

First of all :

- The pressure changes during cardiac cycle
- Aortic curve looks like this .. →
- You can notice the teeth look-like peek , it's called : Incisura
- Incisura only happens and founded in aorta
- All the diagrams we are about to study are located in the left side of the heart .





- ① Dicrotic notch : incisura the sharp point caused by aortic , pulmonary valve closure leading to 2nd heart sound
- ② Dicrotic wave
- ③ Systole
- ④ Diastole
- ⑤ Anacrotic limb (ascending limb)
- ⑥ Dicrotic limb

Why dicrotic wave and notch happen?

← At Incisura the semi lunar valve (aorta) closed, the blood will try to go back through the semi lunar valve (the heart is relaxing), but it will hit the valve and this causes the **Incisura** . When the blood reflect back to aorta this causes the **Dicrotic wave**.

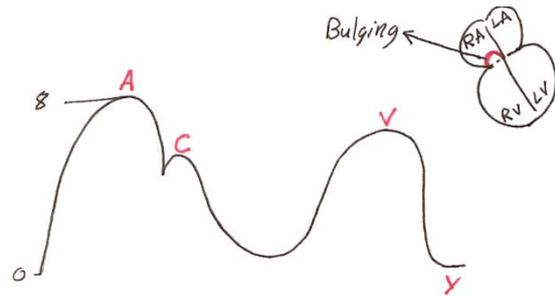
The Atrial pressure

A wave: Because of atrial contraction this will coincide with 4th heart sound.

C wave : isovolumetric contraction: contraction when all valves are closed and there is, The blood will bulge of the AV valve causing C wave.

V wave: Because of Atrial Diastole.

Y wave : blood coming from atrium to ventricle



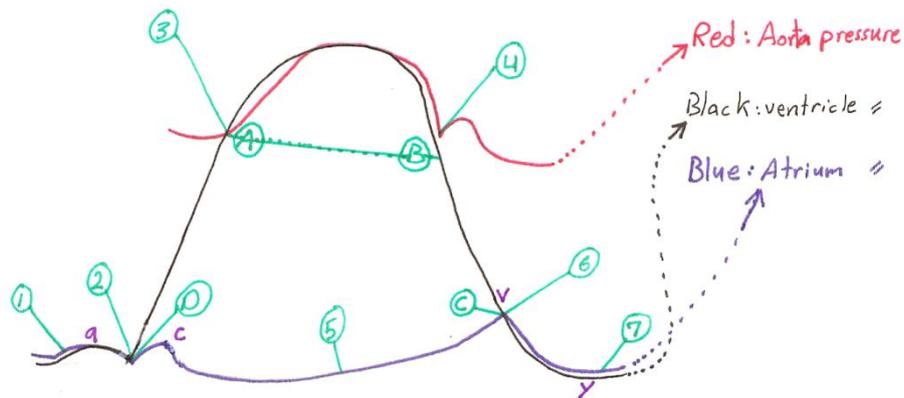
Also to know :

There are 3 positive waves and 3 negative waves

All 3 waves are position waves

Physicians don't care about **C** wave , this is because the kicking if the jugular vein by common carotid artery .

3rd heart sound is heard between **Y** and **V**



- ① Atrial contraction : 4th heart sound
- ② Closing of AV valve (mitral valve) because of high pressure : 1st heart sound
- ③ Opening of semi lunar valve(Aortic valve) : Blood from ventricle to Aorta
- ④ Closure of semi lunar valve(Aortic valve) : relaxation ⑤ Blood is flowing to atrium: the atrium is filled by SVC during atrial diastolic
- ⑥ At the peak of wave, Atrial dilatation : cause blood movement From Atrium to Ventricle
- ⑦ maximum Filling phase : will cause 3rd heart sound (Between V and Y wave) is heard .

A-B maximum ejection and reduced ejection .

D-A Isovolumetric Contraction period .

B-C Isovolumetric relaxation period .

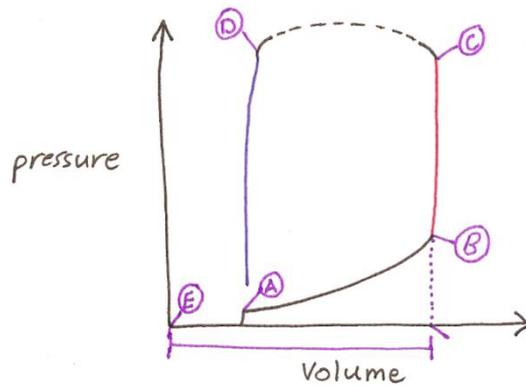
Note

In the end , aortic pressure is more than the ventricle pressure . This is because of the momentum of the blood flow.

Momentum force : when the pressure is high and it want to slow down it needs time

.e.g. when you drive in high speed, then you brake, the car won't stop immediately because of momentum Force .

Volume Pressure Curve (or)
Pressure volume Loop



E-A: End Systolic volume(50 ml of blood in ventricle).

A-B : ventricular Filling phase

E-B : Diastolic volume (120 ml of blood in ventricle)

B-C : Isovolumetric contraction end Diastolic volume (120 ml of blood in ventricle).

C-D : maximum rejection and reduce rejection

D-A : Isovolumetric Relaxation phase .

A opening of mitral valve.

B closure of mitral valve : cause of 1st heart sound

C opening of Aortic valve (semi lunar) .

D Closing of Aortic semi lunar valve: cause of 2nd heart sound

Also to know :

 Radial artery curve
①: diastolic notch & wave

 a curve for an artery far of the heart
this will be near to the base

 IF the artery is near to the heart
this will be far from the base

● What about the right side of heart ?

■ It almost the same but with less volume cause it have thinner wall

That's all :)